

CLAIMS

I/We claim:

- [c1] 1. A method of processing contrast enhanced medical imaging information, the medical imaging information corresponding to a time dependent imaging signal behavior associated with at least one tissue volume, the method comprising:
- automatically determining whether a portion of a tissue volume exhibits an imaging signal washout behavior;
- automatically determining whether the portion of a tissue volume exhibits one from the group of an imaging signal plateau behavior and an imaging signal persistent enhancement behavior in the event that the portion of a tissue volume fails to exhibit an imaging signal washout behavior; and
- identifying at least one likely malignancy within the portion of the tissue volume.
- [c2] 2. The method of claim 1, wherein identifying comprises generating a visual indication of a type of time dependent imaging signal behavior corresponding to the portion of a tissue volume.
- [c3] 3. The method of claim 1, wherein the medical imaging information comprises Magnetic Resonance Imaging data.
- [c4] 4. The method of claim 1, wherein the medical imaging information corresponds to a breast.

- [c5] 5. A method of processing contrast enhanced medical imaging information, the medical imaging information comprising imaging signal intensity values associated with at least one candidate voxel set corresponding to a tissue volume, the method comprising:
- automatically determining whether a candidate voxel set exhibits an imaging signal washout behavior;
- automatically determining whether a candidate voxel set exhibits one from the group of an imaging signal plateau behavior and an imaging signal persistent enhancement behavior in the event that a candidate voxel set fails to exhibit an imaging signal washout behavior; and
- identifying a candidate voxel set as a likely malignancy.
- [c6] 6. The method of claim 5, wherein determining whether a candidate voxel set exhibits an imaging signal washout behavior comprises determining whether a signal enhancement ratio corresponding to a candidate voxel set exceeds a washout threshold value.
- [c7] 7. The method of claim 6, wherein the washout threshold value is approximately equal to 1.1.
- [c8] 8. The method of claim 5, wherein determining whether a candidate voxel set exhibits an imaging signal washout behavior comprises determining whether a slope corresponding to a candidate voxel set is less than a washout slope value.
- [c9] 9. The method of claim 8, wherein the washout slope value is approximately equal to -2.0 percentage units per minute.
- [c10] 10. The method of claim 5, wherein determining whether a candidate voxel set exhibits an imaging signal washout behavior comprises determining

whether an angle corresponding to a candidate voxel set is less than a washout angle value.

[c11] 11. The method of claim 10, wherein the washout angle value is approximately equal to -5 degrees.

[c12] 12. The method of claim 5, wherein identifying a candidate voxel set as a likely malignancy comprises identifying a highest percent enhancement value corresponding to a candidate voxel set.

[c13] 13. The method of claim 5, wherein identifying a candidate voxel set as a likely malignancy comprises identifying a most significant imaging signal intensity decline corresponding to a candidate voxel set.

[c14] 14. The method of claim 5, wherein identifying a candidate voxel set as a likely malignancy comprises identifying a most significant rate of imaging signal intensity decline corresponding to a candidate voxel set.

[c15] 15. The method of claim 5, wherein identifying a candidate voxel set as a likely malignancy comprises generating at least one from the group of a numerical, a textual, a chromatic, and a graphic indication of the likely malignancy.

[c16] 16. The method of claim 5, wherein identifying a candidate voxel set as a likely malignancy comprises generating upon a display device an indication of the likely malignancy.

[c17] 17. The method of claim 5, wherein identifying a candidate voxel set as a likely malignancy comprises visually indicating a type of curve representing a time dependent imaging signal behavior that corresponds to the candidate voxel set.

- [c18] 18. The method of claim 5, wherein identifying a candidate voxel set as a likely malignancy comprises displaying one from the group of a washout curve, a plateau curve, and a persistent enhancement curve.
- [c19] 19. The method of claim 5, wherein determining whether a candidate voxel set exhibits an imaging signal plateau behavior comprises determining whether a signal enhancement ratio corresponding to a candidate voxel set is less than a first threshold value and greater than a second threshold value.
- [c20] 20. The method of claim 20, wherein the first threshold value is approximately equal to 1.1, and the second threshold value is approximately equal to 0.9.
- [c21] 21. The method of claim 5, wherein determining whether a candidate voxel set exhibits an imaging signal plateau behavior comprises determining whether a slope corresponding to a candidate voxel set is less than a first slope value and greater than a second slope value.
- [c22] 22. The method of claim 21, wherein the first slope value is approximately equal to 2 percentage units per minute and the second slope value is approximately equal to -2 percentage units per minute.
- [c23] 23. The method of claim 5, wherein determining whether a candidate voxel set exhibits an imaging signal plateau behavior comprises determining whether a slope corresponding to a candidate voxel set is less than a first angle value and greater than a second angle value.
- [c24] 24. The method of claim 23, wherein the first angle value is approximately equal to 5 degrees and the second angle value is approximately equal to -5 degrees.

[c25] 25. The method of claim 5, wherein identifying a candidate voxel set as a likely malignancy comprises identifying a flattest imaging signal intensity relative to a time period.

[c26] 26. The method of claim 5, wherein identifying a candidate voxel set as a likely malignancy comprises identifying a most strongly enhancing imaging signal intensity relative to a time period.

[c27] 27. The method of claim 5, wherein determining whether a candidate voxel set exhibits an imaging signal persistent enhancement behavior is performed in the event that a candidate voxel set fails to exhibit an imaging signal washout behavior and a candidate voxel set fails to exhibit an imaging signal plateau behavior.

[c28] 28. The method of claim 5, wherein the medical imaging information comprises Magnetic Resonance Imaging data.

[c29] 29. The method of claim 5, wherein the medical imaging information corresponds to a breast.

[c30] 30. A method of processing contrast enhanced medical imaging information, the medical imaging information comprising imaging signal intensity values associated with at least one candidate voxel set corresponding to a tissue volume, the method comprising:

automatically determining whether a candidate voxel set exhibits an imaging signal washout behavior;

automatically determining whether a candidate voxel set exhibits an imaging signal plateau behavior after determining whether a candidate voxel set exhibits an imaging signal washout behavior; and

identifying a candidate voxel set as a likely malignancy.

[c31] 31. A method of processing contrast enhanced medical imaging information, the medical imaging information comprising imaging signal intensity values associated with at least one candidate voxel set corresponding to a tissue volume, the method comprising:

automatically determining whether a candidate voxel set exhibits an imaging signal washout behavior;

identifying a candidate voxel set as a likely malignancy corresponding to a washout behavior in the event that a candidate voxel set exhibits an imaging signal washout behavior;

automatically determining whether a candidate voxel set exhibits an imaging signal plateau behavior in the event that a candidate voxel set fails to exhibit an imaging signal washout behavior; and

identifying a candidate voxel set as a likely malignancy corresponding to a plateau behavior in the event that a candidate voxel set fails to exhibit an imaging signal washout behavior and exhibits an imaging signal plateau behavior.

[c32] 32. The method of claim 31, further comprising identifying a candidate voxel set as a likely malignancy corresponding to a persistent enhancement behavior in the event that a candidate voxel set fails to exhibit an imaging signal washout behavior and a candidate voxel set fails to exhibit an imaging signal plateau behavior.

[c33] 33. A system for processing contrast enhanced medical imaging information, the medical imaging information comprising imaging signal intensity values associated with at least one candidate voxel set corresponding to a tissue volume, the system comprising:

a processing unit; and

a computer readable medium containing program instructions for:

automatically determining whether a candidate voxel set exhibits an imaging signal washout behavior;

one from the group of:

automatically determining whether a candidate voxel set exhibits an imaging signal plateau behavior in the event that a candidate voxel set fails to exhibit an imaging signal washout behavior; and

automatically determining whether a candidate voxel set exhibits an imaging signal persistent enhancement behavior in the event that a candidate voxel set fails to exhibit an imaging signal washout behavior; and

identifying a candidate voxel set as a likely malignancy.

[c34] 34. The system of claim 33, wherein the program instructions for determining whether a candidate voxel set exhibits an imaging signal washout behavior comprise program instructions for performing at least one from the group of a signal enhancement ratio analysis, an imaging signal intensity change analysis, and an imaging signal rate of intensity change.

[c35] 35. The system of claim 33, wherein the program instructions for determining whether a candidate voxel set exhibits an imaging signal plateau behavior comprise program instructions for performing at least one from the group of a signal enhancement ratio analysis, an imaging signal intensity change analysis, and an imaging signal rate of intensity change analysis.

[c36] 36. The system of claim 33, wherein the program instructions for identifying a candidate voxel set as a likely malignancy comprise program instructions for performing at least one from the group of a percent enhancement value analysis, an imaging signal intensity change analysis, and an imaging signal rate of intensity change analysis.

[c37] 37. The system of claim 33, wherein the program instructions for identifying a candidate voxel set as a likely malignancy comprise program

instructions for generating at least one from the group of a numerical, a textual, a chromatic, and a graphic indication of the likely malignancy.

[c38] 38. The system of claim 33, wherein the program instructions for identifying a candidate voxel set as a likely malignancy comprise program instructions for displaying a curve corresponding to the voxel set.

[c39] 39. A computer readable medium containing program instructions for:
automatically determining whether a candidate voxel set that forms a portion of a medical imaging data set corresponding to a tissue volume exhibits an imaging signal washout behavior;

automatically determining whether a candidate voxel set that forms a portion of a medical imaging data set exhibits one from the group of an imaging signal plateau behavior and an imaging signal persistent enhancement behavior in the event that a candidate voxel set fails to exhibit imaging signal washout behavior; and

identifying a candidate voxel set as a likely malignancy.

[c40] 40. The computer readable medium of claim 39, wherein the program instructions for determining whether a candidate voxel set exhibits an imaging signal washout behavior comprise program instructions for performing at least one from the group of a signal enhancement ratio analysis, an imaging signal intensity change analysis, and an imaging signal rate of intensity change analysis.

[c41] 41. The system of claim 39, wherein the program instructions for determining whether a candidate voxel set exhibits an imaging signal plateau behavior comprise program instructions for performing at least one from the group of a signal enhancement ratio analysis, an imaging signal intensity change analysis, and an imaging signal rate of intensity change analysis.

[c42] 42. The computer readable medium of claim 39, wherein the program instructions for identifying a candidate voxel set as a likely malignancy comprise program instructions for performing at least one from the group of a percent enhancement value analysis, an imaging signal intensity change analysis, and an imaging signal rate of intensity change analysis.

[c43] 43. The computer readable medium of claim 39, wherein the program instructions for identifying a candidate voxel set as a likely malignancy comprise program instructions for generating at least one from the group of a numerical, a textual, a chromatic, and a graphic indication of the likely malignancy.

[c44] 44. The computer readable medium of claim 39, wherein the program instructions for identifying a candidate voxel set as a likely malignancy comprise program instructions for displaying a curve corresponding to the candidate voxel set.